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PLANT INDUSTRY STATION, BELTSVILLE, MD. SEPTEMBER 1949

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Salter Charts Ways to Develop World Resources

One of the really big opportunities to make conditions for world peace lies in further developments of agricultural technology based on science and its application. Dr. Robert M. Salter, Bureau chief, expanded this theme in a talk before scientists from 44 countries attending the United Nations Scientific Conference on Conservation and Utilization of Resources at Lake Success, August 19.

He emphasized two needs: (1) For increased emphasis on agricultural research in all parts of the world but particularly in underdeveloped areas where applied research is seriously hampered by the lack of basic knowledge; (2) the development of methods for getting technology into widespread use.

Reviewing the tremendous gains from agricultural technology in the fairly recent past, Dr. Salter noted that these represent the harvest from earlier fundamental research. Because of the enormous differences in soils and climate among various places, techniques can be transferred only where conditions are somewhat similar. Fundamental knowledge, however, can be transferred universally.

As to methods for getting new technology into wider use, Dr. Salter believes that widespread use of a system that requires change in farm organization, management, utilization of land or crops, or general plan of financing will at best come slowly, even in the more advanced areas. Some of the techniques employed in advanced areas can be profitably used in other parts of the world. Other techniques will be of little value. Methods, yet unthought of, will be invented for working with farm people not able to read and for fitting educational programs to the folkways and customs of specific communities.

(Mimeographed copies of the complete address may be obtained by writing Information Division, Plant Industry Station, Beltsville, Md.)

Plant Source of Rare Drug Sought in Africa

Research that holds promise to victims of arthritis and rheumatic fever all over the world and that may mean a new and extremely valuable economic crop for the tropics has been initiated by the U. S. Public Health Service with the cooperation of this Bureau.

Objective is a plant source of cortisone, the substance recently shown to have remarkable effects in reversing the crippling and other symptoms of rheumatoid arthritis. Within the past year scientists of this country have reported that cortisone can be produced from several sources, chief of which are ox bile and hog pituitary gland. None of these sources, however, can supply more than a tiny fraction of the tremendous demand and all are very expensive.

Now it has been found that the seed of an African plant, Strophanthus, produces a substance--sarmentogin--that can be substituted for the animal product. It will offer tremendous advances if the plant can be grown in unlimited quantities to meet any demand. One ton of seed would yield as much cortisone as 12,500 tons of beef animals.

Following the request of President Truman that the Public Health Service and the Department of Agriculture study this plant source, the Bureau, through the Division of Plant Exploration and Introduction, organized an expedition. Dr. John T. Baldwin (PEI) is assigned to conduct an intensive search for plants of the Strophanthus species in tropical Africa. A Virginian, Dr. Baldwin served as an agent in rubber investigations in Brazil during the war. He is acquainted with the section of Africa where the plant grows, having spent 1947-48 in Liberia making an agricultural survey for the State Department.

Dr. Baldwin left the United States July 28. He spent a week in England studying collections of the Strophanthus species in the herbaria at Kew Gardens and the British Museum. He then went to Switzerland where, with Dr. Eric Mosettig of the National Institutes of Health, he consulted with Swiss chemists who have also been working with this plant.

Now in Liberia Dr. Baldwin is taking full notes on the ecology of plants of this group. He is collecting seed and stem cuttings for propagation purposes and seed and roots for chemical analyses. Although only the seed have been tested, it is possible the drug may also occur in other parts of the plant. From Liberia Dr. Baldwin plans to continue the exploration through the Ivory Coast, Gold Coast, Togo, Dohomy, Nigeria, and the Cameroons.

Arrangements are being made in Liberia to hold the collections of basic stocks for propagation until the most valuable types have been ascertained. Before the plants can be produced on a large scale in the tropics considerable research is needed in cultural and harvesting requirements.

PEI records show that the first seed of Strophanthus were received in this country in 1914. The most extensive collection was made by Dr. David Fairchild on an expedition in 1927. Plants from his introductions are now growing in the Plant Introduction Garden at Coconut Grove, Fla. Strophanthus sarmentosus is a woody climber with white and purple flowers.

Cotton Defoliants Showing Promise

Scientists conducting research in cotton defoliation anticipate a series of general and special defoliants adequate to meet nearly all of the varied needs across the Cotton Belt, Dr. W. H. Tharp (C&OFC&D) told the Cotton Mechanization Conference in session at Bennettsville, S. C., in August.

Defoliants available for 1949 include:

(1) Calcium cyanamide, sold this year as Aero-Cyanamid-Special Grade, and believed available in adequate quantity wherever environment permits its use. Applied as a dust it is recommended only in areas where dews or other moisture layers permit slow hydrolysis on the leaf for two hours or more, possibly four.

(2) Ammonium thiocyanate, introduced in 1948 in the irrigated West under the name of Chipman's defoliant. Applied as a spray it has been found effective on mature cotton in the entire absence of dews. Sale will be confined mostly to irrigated West and arid sections of Texas and Oklahoma.

(3) Monosodium cyanamid, tested as X-5 and X-10, is effective as a dust or spray defoliant in the absence of dews. It will be sold mostly in the partially insoluble X-10 formulation that contains about 25 percent of the active ingredient and is intended mainly for dusting.

(4) Potassium cyanate, offered for sale for a short time as Aero Cyanate Weed Killer and known experimentally as X-10 and X-13. Like monosodium cyanamid it is adaptable as a spray and being hygroscopic, it can also be used as an effective dust defoliant in the absence of dews. Very little of this compound will be available this year strictly for defoliation purposes.

Under extensive trial are two new compounds: "Sharples No. EC 3740" and Chipman's "Shed-A-Leaf." Both are used as sprays and offer two more possible solutions for the problems of defoliation in the more arid areas of the Cotton Belt.

Field Day at Woodward Station

Under-Secretary Al J. Loveland will be a featured speaker at the range and crop improvement field day, October 8, at the U. S. Southern Great Plains Field Station, Woodward and Fort Supply, Okla.

Supt. David A. Savage announces that many new developments in research on farm and ranch problems will be presented. The program will cover crop production and homestead plantings as well as range improvement and grazing management. A morning tour of work on the main station will be followed with a barbecue luncheon on the experiment range. Inspection of the beef cattle grazing work, reseeded pastures, and brush control studies on the range will fill the afternoon program.

Inorganic Colloids Hold Soil Humus

Agricultural scientists have long known that soils differ greatly in their ability to hold humus even though climatic conditions may be similar.

Recent researches by F. E. Allison, M. S. Sherman and L. A. Pinck (SM&I) show that one of the major factors involved is the nature and quantity of the minerals present in the finely divided or colloidal state.

When plant materials, such as green manures or straw, are allowed to decay the process proceeds rapidly until 50 or 60 percent of the carbon is given off to the atmosphere as carbon dioxide gas. Microorganisms destroy most of the sugars, alcohols, organic acids and cellulose. Lignin, hemicellulose, and protein, together with the cells of microorganisms, tend to accumulate. The initial rapid loss of plant carbon may be about as great when decay occurs in the soil as apart from the soil, but the later stages of decay are markedly affected by the nature of the inorganic constituents present, as the Bureau workers have shown. The addition of 10 percent colloidal montmorillonite, a common soil mineral, to pure sand usually resulted in an increase of 50 to 90 percent in the residual humus after a year when compared to sand alone. Kaolin, another common soil mineral, was less effective. The explanation for the humus-maintaining effect of the clay minerals seems to be the ability of some of them to combine with certain constituents, chiefly proteins and their degradation products, to form complexes. Little is as yet known about the exact nature of these organic-inorganic complexes, but there is every indication that their formation is much to be desired for at least two big reasons: The mineral slows down decay and thus helps to hold the humus, and the organic matter counteracts the stickiness of the clay, thus markedly improving the physical properties of the soil.

The present studies emphasize the nature of the soil and the composition of the added organic materials as determining factors in humus formation and accumulation under any given climatic conditions. The carbon-nitrogen ratio, so much stressed in past studies, deserves less emphasis than it has received.

New Crystal Wax Onion

Crystal Wax L. 690 onion seed is being released this fall to seedsmen for increase and is expected to be in supply ample enough for release to the public next year.

This improved strain was developed jointly by the Bureau and the Texas Agricultural Experiment Station. It comes from one of the self-pollinated selections made by Dr. H. A. Jones. It seems to have fewer doubles and bolters than present commercial strains and is free of off-colors. It does not have any special insect or disease resistance, however, and is a few days later than Excel. Although L. 690 does not have all the favorable qualities desired in the Crystal Wax variety, it is being distributed to satisfy the demand for an improved onion while more outstanding lines are developed.

Undesirable Strains of Wheat Screened Early in Baking Tests

The development of tests for measuring baking quality has greatly speeded up wheat breeding in recent years, points out Dr. B. B. Bayles (CC&D). We now have measures that make it possible to screen breeding materials in some crosses as early as the third generation.

The tests on quality of new wheats are conducted in Bureau laboratories at Beltsville; Wooster, Ohio; Manhattan, Kansas; and Pullman, Wash. The work at Beltsville is conducted in cooperation with the Grain Branch of PMA; that at all other laboratories in cooperation with the State experiment stations of the respective States. They include a number of determinations. Important among these tests for measuring the quality of soft wheats are pearling index and particle size which measure the hardness of the grain and some milling properties, viscosity, and resistance of dough to mixing which indicates gluten strength, as well as tests in the experimental mill and bake shop to determine how the flours handle in the mill, and the loaf volume and grain and texture of breads, cakes, and the quality of cookies baked from them.

Because hard wheats are used almost entirely for bread flours, it is much easier to measure baking quality in them than in the soft wheats, which go into a variety of bakery products, each requiring flour with somewhat different characteristics.

In bread the main factor appears to be gluten strength. This is tied in closely with the quantity and quality of protein in the grain. The first is determined largely by environment, including available nitrogen in the soil, the second is a definite varietal characteristic but may also be affected by environment. Studies show that while definite increases in loaf volume go with increases in protein content, large differences are found between varieties at the same protein level. Karl F. Kinney at Manhattan has found lower quality protein in wheats grown at locations where the temperatures were well above 90° F. during the last two or three weeks before maturity when the kernels were being filled. The greater the accumulation of temperatures above 90°, the greater the decrease in baking quality. The drop is particularly noticeable in varieties with short mixing time and low baking quality.

Investigators have found a close enough relation between the pearling index of wheat and its quality for soft wheat bakery products to use this test on early generations of breeding material to screen out many of the lines with poor soft wheat quality. Strains that show a satisfactory pearling index are subjected to more complete quality tests within a year or two. The mixogram area, a comparatively new development that measures resistance of dough to mixing, indicates quality for making a sugar type of cookie more reliably than other preliminary tests now used. Low resistance signifies high quality. Another very useful test of soft wheat quality is the sugar type of cookie in which the ratio of width to thickness of cookies baked from a sample of the wheat gives a measure of quality.

Maximum Efficiency of Photosynthesis

The Bureau had a part in the important fundamental research in which Professor Otto Warburg recently determined conclusively that the maximum efficiency of photosynthesis is greater than 75 percent. Establishment of this point means that scientists have moved another step toward being able to deal practically with factors that limit efficiency under the high light and low carbon dioxide concentration of normal growing conditions.

Professor Warburg, head of the Institute of Cellular Physiology in Berlin and a Nobel Medalist in medicine for his work in respiration, returned to the United States last autumn to repeat investigations on this problem. In 1922 he reported studies showing an efficiency of at least 75 percent in obtaining the transfer of energy from visible light to stored chemical forms by photosynthesis. This figure was questioned by other research workers whose results have generally shown an efficiency of only 30 percent.

Cooperating with Dr. Warburg in his recent study were Dr. Dean Burk of the National Cancer Institute, formerly a member of the fertilizer research group of the Department, and Dr. Sterling Hendricks (SMI). Dr. Hendricks did the physics part of the study and provided the spectroscopic equipment used.

Dr. Hendricks points out that higher plants in high light intensity such as normal sunlight are limited in the efficiency of energy transfer, generally giving 5 percent or less. Maximum effectiveness is found at low light intensity for various green algae. Chlorella pyrenodoisa has now become the standard plant for this purpose. Experimentally the amount of carbon dioxide fixed and oxygen liberated by Chlorella must be measured when a given amount of light is used. The light must be of a definite color, constant in intensity, and the amount actually absorbed by the plant must be measured.

Success of the work really turned on two points: (1) Use of an actimometer, a 100 percent efficient light measuring device that could be placed in exactly the same position as the Chlorella suspension; and (2) simultaneous and continuous measurement of carbon dioxide and oxygen affected by use of two manometric vessels having similar liquid but different gas volumes.

Dr. Hendricks ascribes failure of many workers to obtain high photosynthetic efficiencies to an attempt to simplify the problem. They have sought--by working under alkaline conditions--to keep the carbon dioxide out of the gas and thus permit measurement of oxygen pressure changes alone. He notes that errors also apparently crept into the work with the actimometer since a Chlorella suspension can scatter a lot of light without absorption. Finally the trick of growing Chlorella might have been a common pitfall.

The answer, however, is that the efficiency is indubitably greater than 75 percent. During the summer the whole procedure has been considerably simplified and the experiment has been run by general students at the Marine Biological Laboratory, Woods Hole, Mass.

Guide Lines to Further Farm Mechanization

The need for parallel progress in the mechanization of all operations on a single crop or commodity was stressed by Arthur Turner, assistant chief in charge of agricultural engineering, in a talk before the recent United Nations Scientific Conference on Conservation and Utilization of Resources.

Investigations in cotton and sweet potatoes have shown, for example, that the mechanization of harvesting depends to a considerable degree on the uniformity of row spacing, height of ridge, and evenness of planting. All of these are determined largely at the time of planting and in some respects are related to seedbed preparation.

Guide lines for future advancements include fundamental requirements for seedbed preparation, development of precision techniques, planting, cultivation, and weed control, fertilizer distribution, insecticide and fungicide application, and more efficient methods of harvesting, conditioning, processing, and storage for better utilization of all commodities produced.

The solution of such problems, Mr. Turner emphasized, will be found by research teams that include soil physicists, agronomists, plant physiologists, and other scientists collaborating with the engineers.

Commenting on the close relation between machines and methods used on the individual farm and the industrial means for their mass production, Mr. Turner said progress in many less mechanized areas of the world will be concurrent with the expansion of local industries.

New Varieties of Chinese Chestnut Released

Naking, Meiling, and Kuling, the three new horticultural varieties of Chinese chestnut, recently released, are a culmination of breeding work in progress at several field stations and at Beltsville for a number of years under the direction of Dr. H. L. Crane (F&VC&D).

The three parent trees are growing in an orchard in Albany, Ga., planted in 1938 with seedlings from seed introduced from China in 1936 by the Division of Forest Pathology. The trees are very productive. They bear around 100 pounds of nuts per tree at 10 years of age. Young grafted trees of the varieties give promise of continuing this habit of heavy bearing. The nuts of all three varieties are large and attractive, keep well, and are very sweet.

Tested thus far only in the Southeast, it is not known as yet whether or not the new varieties will be adapted to the more northern portions of the country. It is believed that release of these new varieties will stimulate the production of grafted trees by nurserymen and place chestnut growing on a sounder basis.

Further breeding and selection to develop horticultural types adapted in central and northern parts of the country is being carried on at Beltsville by Dr. John W. McKay. This season he has set out about 2,000 Chinese chestnut selections.

Research Contributions in Range Improvement

Reviewing ways in which range research will aid Western ranchers to stabilize and increase production on grazing lands, Dr. Wesley Keller (FC&D), Logan, Utah, observes that:

Brush removal studies have already contributed greatly to the improvement of forage resources. Methods now being effectively used include controlled fire on certain sites, mowing with recently developed heavy machines, and treatment with chemical sprays.

Areas in the sagebrush zone reseeded chiefly with crested wheatgrass have increased forage production five to 15 times.

Greatest gains, however, are promised in the development of superior grasses. Some superior strains such as the southern type bromes have already been developed in plant breeding research and are now on the market. All grasses of value on the Western ranges are highly variable. It is this variation that the grass breeder utilizes either through the elimination of inferior types or the selection of those that are superior.

As evidence that strains of crested wheatgrass differ just as much as the better known varieties of wheat or potatoes in productivity--though probably not in conspicuous identifying characteristics--Dr. Keller cites findings in tests on a dry farm in Cache Valley. During the past four years the most productive strain of 12 sources of crested wheatgrass exceeded the locally available commercial type by 71 percent. When the two strains were grown in combination with alfalfa, the better one exceeded the commercial by 56 percent. It was 84 percent more productive in combination with alfalfa than when grown alone. This is just one example of how adapted legumes may substantially increase forage production on the better range sites.

Onion Storage Research Inaugurated in Colorado

A new research project on onion storage has been started in Colorado's Arkansas Valley by the Division of Farm Buildings and Rural Housing in cooperation with the Colorado Experiment Station.

Purpose of the study is to determine the best environment for curing and keeping the sweet Spanish onion grown in the area and to devise means for maintaining this environment in storage structures. The onion is a high moisture type, readily susceptible to disease in storage. The investigations will include the running of checks on quality and condition of onions entering and leaving storages and on the temperature, humidity, and air movement within the structures.

Headquarters are at Rocky Ford where the Arkansas Valley Branch Experiment Station is located. Philip B. Doherty, Iowa State College graduate, who has been working with the Division on grain storage at Ames since July 1948, will be in charge of the work for the Bureau. W. C. Edmundson (F&VC&D) who is stationed at Greeley will be available as a consultant.

An Isotopically Tagged Growth Regulator

A growth-regulating substance closely related to 2,4-D and containing radioactive iodine (2,4-dichloro-e-iodo 131 - phenoxyacetic acid) is being used successfully by Dr. J. W. Mitchell and P. L. Linder to determine the rate at which this compound is absorbed, translocated, and accumulated in different parts of plants. The material was synthesized by Dr. John Wood and associates, of the Division of Biologically Active Chemicals, BAIC.

In another phase of the study a group of plant growth regulating substances containing nicotine has been recently discovered. One of these compounds is 2,4-dichlorobenzylnicotinium chloride. Bean plants sprayed with it developed shorter, more sturdy stems than did untreated ones. When it was applied to the stems of bean seedlings grown in darkness, sturdy plants developed similar in appearance to normal field-grown seedlings except they did not develop chlorophyll. This is in contrast to the spindling type of growth usually produced in darkness.

Self-Propelled Fiber Flax Puller Under Test

A newly designed fiber flax puller, self-propelled and embodying several other advanced features, is under trial in the Division of Mechanical Processing of Farm Products. This work is a cooperative project with Oregon State College and the State Experiment Station. Jesse E. Harmond is in charge for the Bureau.

One of a number of pieces of mechanized equipment intended to help the fiber flax industry of the Pacific Northwest compete with foreign production, the new puller is designed to handle flax at a somewhat greener stage when it gives a better fiber yield. It has narrow puller throats that cause the stalks to be pulled almost straight out without bending. A double-tie device insures more even bundles. Two engines are used on the machine. One propels it. The other operates the pulling mechanism.

Engineers Review Bids on CCC Grain Storage

Wallace Ashby and E. G. Molander (FB&RH) are serving as technical consultants to Elmer F. Kruse of the CCC in awarding contracts for shelled corn and small grain storage to be purchased to handle CCC loan stocks. More than 200 bidders responded to the Corporation's invitation for bids on bins of any design. The engineers are reviewing the plans and specifications to determine structural and functional adequacy.

Two Sections of ASHS Meet in Canada

Research workers having a common interest in cold climate horticulture were brought together in August at a joint meeting of the Plains section and the New England section of the American Society for Horticultural Science. Meetings started with a field tour at Vineland, Ontario. Formal sessions were held at Ottawa. Dr. Leroy Powers of the Cheyenne Horticultural Field Station is president of the Plains section this year. H. A. Rollins of the Connecticut Experiment Station heads the New England section.

NOTES ON PERSONNEL

Nelson Assists in Irrigation Research

Dr. Lewis B. Nelson became assistant work project leader for soil management investigations under irrigation, July 1, with headquarters at Fort Collins, Colo.

Dr. Nelson will assist Dr. O. J. Kelley in directing the Federal phases of cooperative studies in the 17 Western States. The program includes work on field stations formerly under the old Division of Western Irrigation Agriculture at Newell, S. D., Scottsbluff, Neb., Huntley, Mont., Fallon, Nev.--investigation on newly irrigated lands at Prosser, Wash., and Yuma Ariz.--at the Rubidoux Laboratory at Riverside, Calif.--at a new station established at Brawley, Calif.--recently initiated studies in irrigation at Tucumcari, N. M.--and at several locations where RMA projects have been started.

Dr. Nelson is a native of Idaho and holds degrees from the University of Idaho and the University of Wisconsin. Before his appointment in the irrigation studies he was on joint employment from March 1, 1949, to June 30, with the Iowa State College of Agriculture and the Division of Soil Management and Irrigation in studies of phosphate. Prior to that he had been associate professor of research in soils and agronomy at Iowa State College from 1944. During the early part of the war he was supervising chemist and technical agricultural representative for the U. S. Rubber Company.

Brown to Salinity Laboratory

John C. Brown, who recently received his Ph.D from Michigan has been reinstated by the Division of Soil Management and Irrigation to study the root-soil relationship of plant nutrient absorption with special attention to zinc and other minor elements which might be involved in the chlorosis of plants. These studies are a part of the project recently initiated in cooperation with the Atomic Energy Commission. Dr. Brown has been assigned to work with Dr. C. H. Wadleigh at the Salinity Laboratory, Riverside, Calif., for three months. Upon returning to Beltsville he will work under the general direction of Dr. S. B. Hendricks.

Dr. Brown is a native of Utah, a graduate of Brigham Young University at Provo and now has his doctorate from Michigan. His education was interrupted by the war during which he first served with the Ordnance Department as civilian ammunitions inspector and later as enlisted man in the Air Forces. From July to September 1946 he was on appointment as soil scientist in the Soil Survey Division.

Society Honors Agricultural Engineers

S. W. McBirney (FM) received an award from the American Society of Agricultural Engineers for writing one of the five top-scoring papers published in Agricultural Engineering during 1948. The paper was "The Relation of Planter Development to Sugar Beet Seedling Emergence."

Among five papers receiving equal ratings just below the top five and given honorable mention was one on "How to Reduce Ear Corn to Bushels of Shelled Corn," by J. L. Schmidt (FB&RH).

Listed among the 25 best papers were "Types and Performance of Farm Grain Driers," by W. V. Hukill (FB&RH) and "Problems in the Design of Chemical Weed-Control Equipment for Row Crops," of which R. A. Norton (FM) was a co-author.

John W. Rockey (FB&RH) is the new vice chairman of the Washington section of the society. Harry L. Garver is the retiring chairman.

Hagen Joins Atomic Energy Project

Clarence C. Hagen has joined the group conducting research in basic soil plant relationships with radioactive materials. His work will deal with the use of radioactive isotopes in studying function of minor nutrient elements in plants.

Born in Minnesota, Mr. Hagen spent much of his life in North Dakota and received a B.S. and M.S. degree from North Dakota State Agricultural College. During the war he worked on fissionable material with the Manhattan project at Los Alamos, N. M. Prior to the war and from July 1946 to February 1947 he was employed by Spencer Kellogg and Sons, first as control chemist and later in the technical service department.

Beecher to Alaska

F. Sidney Beecher (F&VC&D) is on a 3-month assignment to the Matanuska Experiment Station at Palmer, Alaska, where he is assisting Dr. M. F. Babb, horticulturist, in making records in the potato breeding project.

Wadleigh Elected

Dr. C. H. Wadleigh (SMI) of the U. S. Regional Salinity Laboratory, Riverside, Calif., has been elected vice president of the American Society of Plant Physiologists.

RETIREMENTS

Abbie Ballard Brooks, technical editor, Division of Information, August 31, after 31 years of government service. Mrs. Brooks came with the Department in 1933 as senior clerk in Forest Service. She joined the Bureau as a technical editor in June 1939.

DEATHS

Dr. Bryan Lewellyn Wade, formerly director of the Regional Vegetable Breeding Laboratory at Charleston, S. C., died July 28 at Urbana, Ill.

A native of Vanvoorhis, W. Va., Dr. Wade held B.S. and M.S. degrees from the University of West Virginia and a Ph.D degree from the University of Wisconsin. He joined the Bureau staff in 1932 as a geneticist in vegetable investigations. In 1936 he was placed in charge of the newly established laboratory at Charleston. He resigned in August 1948 to become head of the department of horticulture at the University of Illinois.

Dr. Wade's work in the Bureau included development of a number of improved strains of beans and peas, with special attention to disease resistance and increased vitamin content; studies on the genetics of disease resistance in various vegetables; development of a successful program of basic research in vegetable breeding at Charleston; and establishment of cooperative relationships with the agricultural experiment stations of the Southeastern Region.

Vincent C. Hubbard, 42, agronomist at the Havre (Mont.) Field Station, died July 23, 1949, of acute leukemia.

Mr. Hubbard was born in Fairfax, S. D. He was a graduate of the University of Minnesota with a B.S. degree in 1927 and of Kansas State College with an M.S. in 1929. He joined the Bureau as an agronomist with the Division of Cereal Crops and Diseases in 1929 at Mandan, N. D. From 1935 to 1946 he worked at the Southern Great Plains Field Station, Woodward, Okla. Then he became superintendent of the Sheridan (Wyo.) Field Station, a position from which he resigned to farm for himself. Reinstated as a joint employee of the Bureau and the Montana Experiment Station, he had been on the staff at Havre since May 1947. He leaves his widow and two children.

ADMINISTRATIVE REGULATIONS

New Bulletin Series Established

That city people are turning in increasing numbers to the Department for information is recognized in two new publication series recently announced by the Office of Information. One of these is the Home and Garden Series, which presents in popular form information on home building and growing vegetables, flowers, and fruits for home use. Agriculture Information Bulletins, a second new series, will contain subject matter of interest to people and groups throughout the American public. This series will include most publications previously in the Miscellaneous Publications series that should have a wider audience than rural people alone. Of considerable interest to Bureau researchers who have felt the need of a publication series for comprehensive studies is the establishment of the new Agriculture Monographs, a technical series covering broad fields of research.

PUBLICATIONS

Departmental

Farmers' Bulletin 613 (rev.)- Goldenseal under Cultivation
Farmers' Bulletin 2009 - Storage of Small Grains and Shelled Corn on the Farm
Farmers' Bulletin 2010 - Storage of Ear Corn on the Farm

Circular 809 - Mosaics of Winter Oats

Miscellaneous Publication 219 (rev.) - Treat Seed Grain

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